CLAIMS

1. A self-contained electronic pressure monitoring and shutdown device comprising:

a switch-gauge with adjustable high and low pressure electrical contacts to switch an electrical signal corresponding to the respective high and low pressure alarm condition;

a pulse driven solenoid valve;

a high pressure indicator lamp;

a low pressure indicator lamp;

a low battery indicator lamp;

a system OK indicator lamp;

a "Test" manually activated electrical contact;

a "Reset" manually activated electrical contact;

a battery powered power module that supplies two separate voltages for providing independent power sources to the electronic logic circuit and the solenoid valve driver circuits;

an electronic logic circuit electrically coupled to the switch-gauge, pulse driven solenoid valve, indicator lamps and manually activated electrical contacts wherein the electronic logic circuit provides the following logic functions:

generates one or more consecutive shutdown pulses to trip the solenoid valve and flashes the high pressure alarm lamp when a high pressure condition is detected by the switch-gauge and confirmed by re-reading the alarm signal for about one second;

generates one or more consecutive shutdown pulses to trip the solenoid valve and flashes the low pressure alarm lamp when a low pressure condition is detected by the switch-gauge and confirmed by re-reading the alarm signal for about one second;

latches the last cause of shutdown and maintains the corresponding alarm lamp flashing even if the cause for the shutdown is no longer present or a different alarm is detected after the shutdown;

when the "Reset" manually activated electrical contact is actuated by the operator it stops flashing the alarm lamps, generates one or more pulses to open the solenoid valve and ignores existing high and low pressure alarms for a preprogrammed number of minutes to allow the process to reach normal pressure;

flashes the system OK lamp every one or two seconds when no alarms have been detected since the last "Reset";

periodically reads the voltages supplied by the power module to confirm power supply is providing proper voltage;

flashes the low battery voltage lamp when one of the voltages from the power module falls below pre-programmed normal but not low enough to compromise reliable operation.

generates one or more consecutive shutdown pulses to trip the solenoid valve and flashes the low battery voltage alarm lamp when one of the voltages from the power module falls below a preprogrammed "low-low" voltage;

maintains memory of the last cause of shutdown after the system has been reset;

when the "Test" manually activated electrical contact is actuated by the operator it flashes the lamp corresponding to the last cause of shutdown

for a few seconds and then flashes each alarm lamp to confirm they are in good working order.

2. The self-contained electronic pressure monitoring and shutdown device of claim 1 wherein the high voltage provided by the power module is connected in parallel with a capacitor of at least 1,000 uF for boosting pulse current capacity.

3. The self-contained electronic pressure monitoring and shutdown device of claims 1 and 2 wherein the electronic logic circuit has the means to be configured in such a way that it will delay the alarm and shutdown on the high and/or low pressure alarms for a preprogrammed number of seconds to prevent shutting down the process if the alarm is only temporary.

4. A self-contained electronic pressure monitoring and shutdown device comprising:

a switch-gauge with adjustable high and low pressure electrical contacts to switch an electrical signal corresponding to the respective high and low pressure alarm condition;

a pulse driven solenoid valve;

a high pressure indicator lamp;

a low pressure indicator lamp;

a low battery indicator lamp;

a system OK indicator lamp;

a "Test" manually activated electrical contact;

a "Reset" manually activated electrical contact;

a solar powered power module that stores energy in capacitors, sized to store enough energy to keep the device in operation throughout the night or longer;

an electronic logic circuit electrically coupled to the switch-gauge, pulse driven solenoid valve, indicator lamps and manually activated electrical contacts wherein the electronic logic circuit provides the following logic functions:

generates one or more consecutive shutdown pulses to trip the solenoid valve and flashes the high pressure alarm lamp when a high pressure condition is detected by the switch-gauge and confirmed by re-reading the alarm signal for about one second;

generates one or more consecutive shutdown pulses to trip the solenoid valve and flashes the low pressure alarm lamp when a low pressure condition is detected by the switch-gauge and confirmed by re-reading the alarm signal for about one second;

latches the last cause of shutdown and maintains the corresponding alarm lamp flashing even if the cause for the shutdown is no longer present or a different alarm is detected after the shutdown;

when the "Reset" manually activated electrical contact is actuated by the operator it stops flashing the alarm lamps, generates one or more pulses to open the solenoid valve and ignores existing high and low pressure alarms for a preprogrammed number of minutes to allow the process to reach normal pressure;

flashes the system OK lamp every one or two seconds when no alarms have been detected since the last "Reset";

periodically reads the voltages of the main capacitors of the power module and controls an output signal to activate a switcher voltage regulator that transfers energy from a high voltage storage capacitor to a low voltage capacitor so the low voltage is kept within a range that insures the reliable operation of the electronic logic module;

generates one or more consecutive shutdown pulses to trip the solenoid valve when any of the main capacitors reaches below a preprogrammed "low-low" voltage;

maintains memory of the last cause of shutdown after the system has been reset;

when the "Test" manually activated electrical contact is actuated by the operator, it flashes the lamp corresponding to the last cause of shutdown for a few seconds and then flashes each alarm lamp to confirm they are in good working order.

5. The self-contained electronic pressure monitoring and shutdown device of claim 4 wherein the electronic logic circuit has the means to be configured in such a way that it will delay the alarm and shutdown on the high and/or low pressure alarms for a preprogrammed number of seconds to prevent shutting down the process if the alarm is only temporary.